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Irrigation Automation

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Abstract- *Irrigation Automation is used to Sense Soil Moisture Content and intended to produce an automated irrigation mechanism. The proposed system turns the pump motor ON and OFF or changes it's rpm, on detecting the moisture content of the soil. In the field of farming, utilization of appropriate means of irrigation is significant. The advantage of using this technique is to decrease human intervention and make irrigation more reliable. This automated irrigation brings into show an Arduino board ATmega328 micro-controller, is set to collect the input signal of changeable moisture conditions of the soil via moisture detecting system. Principle of this automation is DTMF based cellular technology which has greater penetration than internet in rural areas.*

Key Words: **Arduino, Irrigation, Soil Moisture Sensor, DTMF, Automated Irrigation Mechanism.**

1. INTRODUCTION

In the present scenario demand for food is continuously increasing and hence requires rapid improvement in food production technology. Generally a simple and precise method should be used for a country like India, where the economy is mainly based on agriculture. It helps in time saving, removal of human interference in agriculture. Due to uncertainty in the climatic conditions, still an error can occur in adjusting available soil moisture levels and we are not able to make full use of agricultural resources and increase their net profits. The main reason is the lack of rainfall& scarcity of fertile land. Irrigation is the artificial means of supplying water to the soil reservoir. The continuous extraction of water is usually needed in growing the crops. Ground water lever has decreased to a much extent due to which lot of areas have becomes dry and barren but due to the scarcity of land farmers are forced to cultivate the crops in these regions as well. In these areas rainfall is very scarce even in the monsoon season, rainfall arrives very slowly in these regions. Another shortcoming is to protect crops from frost. Very important reason of this is the unplanned use of Irrigation water due to which a significant amount of water is wasted. In irrigation, this technique is very significant. Advantage of this technique is that water is supplied to soil by sensing its moisture content. In this, water is supplied only when the moisture content is below the required level. Due to which a large quantity of water is saved. At the present era, the farmers have been using the conventional irrigation techniques like methods through manual control sprinklers, flood type feeding system (in which farmers irrigate the land at the regular intervals). Water is supplied generally to lower leaves and stem of the plants along with the soil. This process sometimes consumes more water than requires or sometimes the surface becomes saturated, unable to absorb more water and often stays wet, long after irrigation is completed and the area becomes like quagmire. Sometimes the water reaches late due to which crops are destroyed because such condition promotes infections when leaves get dried. Water deficiency can be detrimental to plant's mold fungi. On the contrary this technique acts before visible wilting occurs. Slowed growth rate, occurs due to the water deficiency. This problem can be solved if we maintain favourable soil condition with the help of controller based irrigation system in which the moisture condition are retained and prevent moisture loss from the plant. This saves requirement of water. Further in country like India cellular technology has much deeper penetration than internet so technology like DTMF offers lots of promises and it's easy interface makes it one of the best options for Indian farmers.

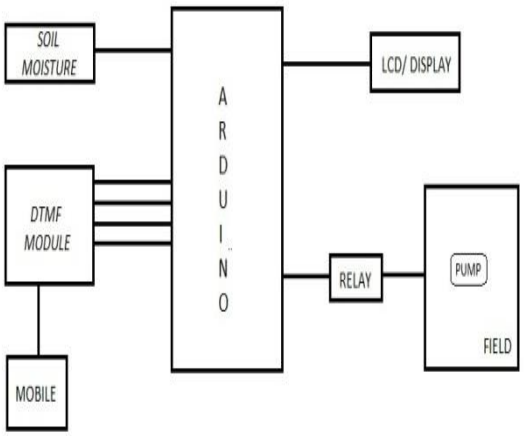

Fig -1: Block diagram of module

2. IRRIGATION

Little amount of water is only lost to deep percolation if the proper amount of water is applied. Controller based irrigation is a popular method these days because in this type of irrigation system it uses relay to turn the process of irrigation ON and OFF hence increase yields of the crops and decrease water requirements and then after supplying enough water it turns OFF automatically. These relay can be easily programmed with the help of Arduino and controlled via DTMF System.

Controller based irrigation requires about half of the water in comparison to the other traditional irrigation methods. This method of irrigation allows farmers to apply the right amount of water to the crops. Lower operating pressures of water applied at the right time, regardless of the availability of it and flow rates results in reduced energy costs. A high labor is not required to turn motor on and off. In addition, farmer can control the amount of water supplied to the crops. Automation equipment are able to reduce runoff from over the crops , plants can be supplied with more precise amounts of less water saturating soils and can avoid the irrigation at the wrong time. Disease and insect damage is reduced with this method, and will improve crop performance by ensuring foliage stays dry. Operating cost is usually reduced. Adequate water and nutrients is supplied when needed. Controller based irrigation is a valuable tool for accurate soil moisture. The capacity of soil to retain water is a function of soil texture and structure. When a sample of soil is taken, the soil being examined sometimes becomes disturbed in artificial environment, so its water-holding capacity is altered. Indirect methods of measuring soil moisture are helpful as they allow information to be collected at the same location for further many observations without disturbing the soil water system. In this technology a soil moisture sensor is used along with DTMF (Dual Tone Multi Frequency). A humidity sensor is also used. These sensors are buried deep in the ground. A cell phone is also connected to these sensors. When there is an acute shortage of water in the soil these sensors will inform the microcontroller which in turn will OFF the relay and the pump will get started to supply water to the ground. Along with this an LCD is also used. The signals from both soil moisture sensor and humidity sensor are received by ARDUINO board. Because this method is based on ultimately profit. , it is the standard with which all other methods are to be compared.

3. SOIL MOISTURE

Soil moisture is an important component of natural resources available on earth and is equally favourable for humans both on a small agricultural scale and in large scale modelling of land/atmosphere interaction. Vegetation and crops always depend more on the moisture available at root of the crops than on rainfall occurrence. Information of the moisture of the local soil is always needed for irrigation planning as well as for the actual scheduling of irrigation process. Familiarity of the degree of soil dampness helps to forecast the risk of flash floods and the occurrence of fog.

Knowledge of the soil water potential proves to be very helpful and it gives an expression of the soil water energy status. The relation which monitors and controls all the activities of controller based irrigation is not universal and depends upon the irrigation system efficiently. The suggestion is on the characteristics of the local soil, such as soil density to modernize the agriculture industries and improve the soil texture with the help of optimum expenditure. Using this automated irrigation system with DTMF technology, one of the basic technique for measuring soil water content can be made easier and hence can save the manpower and reduce the amount of water wastage. This method is hence based on ultimate yield and it is the standard with which all other methods are compared.

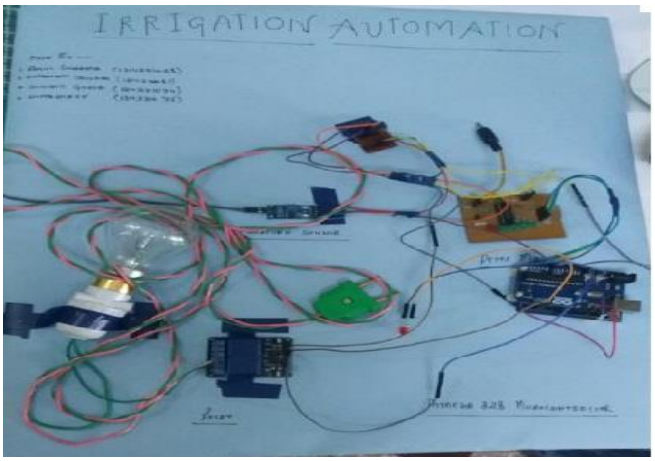

Fig -2: Prepared module

4. RESULT

Irrigation becomes easy, accurate and practical by using automation in irrigation. Theideaabove shared can be implemented in rural areas where IOT is still not a practical option .Furtherdifferent types of sensor can be integrated through this system like soil moisture. The output of soil moisture is shown below. It displays different conditions

depending on the value it receives, which can be further used to start or stop the pump (in the module we use bulb instead of pump). If water level reaches the desired level then pump automatically gets off.

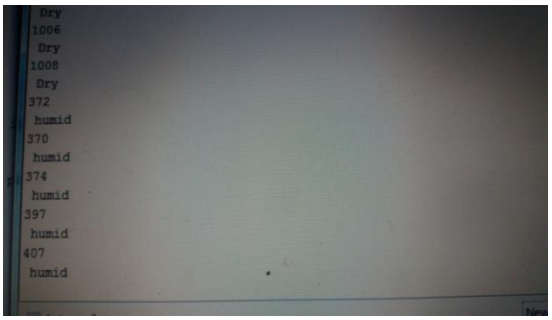

Fig -3: Output from soil moisture, can be displayed through LCD at site.

5. CONCLUSION

The primary applications for this project are for farmers and gardeners who do not have enough time to water their Crops/plants. It also covers those farmers who are wasteful of water during irrigation. The project can be extended to greenhouses where manual supervision is far and few in between. The principle can be extended to create fully automated gardens and farmlands. Combined with the principle of rain water harvesting, it could lead to huge water savings if applied in the right manner. In agricultural lands with severe shortage of rainfall, this model can be successfully applied to achieve great results with most types of soil.

REFERENCES

[1] Klute, A. (ed.), 1986: Methods of Soil Analysis, Part 1: Physical and Mineralogical Methods. American Society of Agronomy, Madison, Wisconsin, United States, 1188 pp.

[2] Knight, J.H., 1992: Sensitivity of time domain reflectometry measurements to lateral variations in soil water content. *Water* Resources Research, 28, pp. 2345–2352.

[3] Magagi, R.D., Kerr, Y.H., 1997. Retrieval of soil moisture and vegetation characteristics by use of fRS-1 wind scatterometer over arid and semi-arid areas. Journal of Hydrology 188-189, 361–384.

[4] Marthaler, H.P., *W. Vogelsanger, F. Richard and J.P. Wierenga,* 1983: A pressure transducer for field tensiometers. *Soil Science Society of America Journal,* 47, pp. 624–627.

[5] Attema, Evert, Pierre Bargellini, Peter Edwards, Guido Levrini, SveinLokas, Ludwig Moeller, BetlemRosich-Tell, et al 2007.